

THE CLAIMS

What is claimed is:

1. A golf ball comprising:
a core having a Shore C hardness of about 70 or less, the core comprising at least a core layer comprising:
an elastomeric composition,
a reactive co-agent present by less than about 10 phr by weight of the elastomeric composition, and
a cross-linking agent;
at least a first intermediate layer encasing the core, the first intermediate layer having a Shore C hardness of about 70 to about 75; and
a cover encasing the first intermediate layer, the cover having a Shore C hardness of about 60 or less.
2. The golf ball of claim 1, wherein the elastomeric composition comprises a diene polymer.
3. The golf ball of claim 2, wherein the cross-linking agent is a peroxide.
4. The golf ball of claim 3, wherein the diene polymer is a polybutadiene.
5. The golf ball of claim 2, wherein the cross-linking agent is sulfur.
6. The golf ball of claim 5, wherein the diene polymer is an ethylene-propylene-diene polymer.
7. The golf ball of claim 6, wherein the ethylene-propylene-diene polymer comprises about 70% to about 90% ethylene.
8. The golf ball of claim 7, wherein the ethylene-propylene-diene polymer further comprises about 1% to about 5% ethylidene-2-norborene.

9. The golf ball of claim 1, wherein the elastomeric composition comprises a material selected from a group consisting of metallocene catalyzed polymers, poly(styrene-butadiene-styrene), SEBS, SEPS block polymers, styrene-ethylene block copolymers, and polar group grafted or copolymerized polymers.
10. The golf ball of claim 1, wherein the reactive co-agent is present by less than about 5 phr.
11. The golf ball of claim 1, wherein the reactive co-agent is present by about 0 phr.
12. The golf ball of claim 1, wherein the reactive co-agent comprises a metal salt of diacrylate, dimethacrylate, or monomethacrylate, or a non-metallic oligomer.
13. The golf ball of claim 12, wherein the metal is selected from zinc, magnesium, calcium, barium, tin, aluminum, lithium, sodium, potassium, iron, zirconium, and bismuth.
14. The golf ball of claim 1, wherein the core further comprises an innermost core encased by the core layer.
15. The golf ball of claim 14, wherein the innermost core comprises a diene polymer and about 10 phr to about 50 phr of a reactive co-agent.
16. The golf ball of claim 14, wherein the innermost core comprises a diene polymer and at least about 50 phr of a reactive co-agent.
17. The golf ball of claim 1, wherein the golf ball further comprises a second intermediate layer encasing the first intermediate layer, the second intermediate layer being harder than the first intermediate layer, and having a Shore C hardness of about 72 to about 77.

18. The golf ball of claim 17, wherein the golf ball further comprises a third intermediate layer encasing the second intermediate layer, the third intermediate layer being harder than the second intermediate layer, and having a Shore C hardness of about 75 to about 80.
19. The golf ball of claim 18, wherein the first, second, and third intermediate layers each has a thickness of less than about 2.54 mm.
20. The golf ball of claim 18, wherein the first, second, and third intermediate layers each has a thickness of less than about 1.27 mm.
21. The golf ball of claim 18, wherein the first, second, and third intermediate layers each has a thickness of about 0.76 mm to about 1.27 mm.
22. The golf ball of claim 1, wherein the core has a diameter of about 31.75 mm to about 40.64 mm.
23. A golf ball comprising:
a core having a Shore C hardness of about 75 or more, the core comprising at least a core layer comprising:
 an elastomeric composition,
 a reactive co-agent present by less than about 10 phr by weight of the elastomeric composition, and
 a cross-linking agent;
at least a first intermediate layer encasing the core, the first intermediate layer having a Shore C hardness of about 72 to about 75; and
a cover encasing the first intermediate layer, the cover having a Shore C hardness of about 70 or more.
24. The golf ball of claim 23, wherein the elastomeric composition comprises a diene polymer.

25. The golf ball of claim 24, wherein the cross-linking agent is a peroxide.
26. The golf ball of claim 25, wherein the diene polymer is a polybutadiene.
27. The golf ball of claim 24, wherein the cross-linking agent is sulfur.
28. The golf ball of claim 27, wherein the diene polymer is an ethylene-propylene-diene polymer.
29. The golf ball of claim 28, wherein the ethylene-propylene-diene polymer comprises about 70% to about 90% ethylene.
30. The golf ball of claim 29, wherein the ethylene-propylene-diene polymer further comprises about 1% to about 5% ethylidene-2-norborene.
31. The golf ball of claim 23, wherein the elastomeric composition comprises a material selected from a group consisting of metallocene catalyzed polymers, poly(styrene-butadiene-styrene), SEBS, SEPS block polymers, styrene-ethylene block copolymers, and polar group grafted or copolymerized polymers.
32. The golf ball of claim 23, wherein the reactive co-agent is present by less than about 5 phr.
33. The golf ball of claim 23, wherein the reactive co-agent is present by about 0 phr.
34. The golf ball of claim 23, wherein the reactive co-agent comprises a metal salt of diacrylate, dimethacrylate, or monomethacrylate, or a non-metallic oligomer.
35. The golf ball of claim 34, wherein the metal is selected from zinc, magnesium, calcium, barium, tin, aluminum, lithium, sodium, potassium, iron, zirconium, and bismuth.

36. The golf ball of claim 23, wherein the core further comprises an innermost core encased by the core layer.
37. The golf ball of claim 36, wherein the innermost core comprises a diene polymer and about 10 phr to about 50 phr of a reactive co-agent.
38. The golf ball of claim 36, wherein the innermost core comprises a diene polymer and at least about 50 phr of a reactive co-agent.
39. The golf ball of claim 23, wherein the golf ball further comprises a second intermediate layer encasing the first intermediate layer, the second intermediate layer being softer than the first intermediate layer, and having a Shore C hardness of about 70 to about 73.
40. The golf ball of claim 39, wherein the golf ball further comprises a third intermediate layer encasing the second intermediate layer, the third intermediate layer being softer than the second intermediate layer, and having a Shore C hardness of less than about 70.
41. The golf ball of claim 40, wherein the first, second, and third intermediate layers each has a thickness of less than about 2.54 mm.
42. The golf ball of claim 40, wherein the first, second, and third intermediate layers each has a thickness of less than about 1.27 mm.
43. The golf ball of claim 40, wherein the first, second, and third intermediate layers each has a thickness of about 0.76 mm to about 1.27 mm.
44. The golf ball of claim 23, wherein the core has a diameter of about 31.75 mm to about 40.64 mm.